Pesticide Session 2: OPP Benchmarks, States' Water Quality Standards, and OW National and GLI Criteria

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SWiMS, Chicago, IL, March 20, 2008

Minnesota Pollution Control Agency

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When it comes to pesticides, are there: Overlapping functions between agencies? Untapped opportunities for collaboration?

- Building on Pesticide Session 1:
  - Roles of EPA's Office of Pesticide Programs (OPP) and FIFRA SLAs in pesticide monitoring, reporting and responses.
- Pesticide Session 2 will cover:
  - Roles of EPA OPP, Office of Water and Clean Water Act SLAs in human health risk and ecological assessments and regulatory responses.
  - Presentations from Minnesota, Michigan, and Illinois

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How to evaluate surface water monitoring results for pesticides?

- OPP Registration
  - Levels of Comparison (LOCs) and Population Adjusted Doses (PADs) for human health
  - Aquatic Life Benchmarks (most sensitive species)
- OW Federal Water Quality Criteria (guidance to states)
  - Few current use pesticides (resource have to cover broad range of surface water pollutants)
- State and Tribal Water Quality Standards
  - Thresholds established by legislation or by program rule/policy
  - Approved by EPA

OPP Registration and Reregistration Eligibility Decisions

- Registrant requirements for > 100 studies: toxicity to laboratory mammals and target and nontarget plants and animals, fate and transport, residue in foods, etc. (http://www.epa.gov/pesticides/regulating/index.htm)
- Specific Studies (see CFR part 158)
- Supplemented by: Data Call-ins, open literature, monitoring data, and epidemiological studies
- Data Evaluation Records (DERs) from OPP scientists or their consultants
  - DERs publicly available
  - Not original registrant studies (FIFRA)

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OPP Registration and Reregistration Eligibility Decisions

- Reregistration and Tolerance FQPA (Food Quality Protection Act 1996) Reassessment Process
  - Human health exposure modeling and toxicological Levels of Comparison (LOC) for active ingredients
    - Degradates and other A.I.s with the same mode of toxic action.
  - Include occupational, residential, food residue, and drinking water exposure
  - Differences for infants and children
  - Protection: "reasonable certainty of no harm" with labeled uses

Human Health Protection

Drinking Water Level of Comparison – DWLOC (ppm or mg/L): What is it?

- Acceptable concentration of a pesticide in drinking water
  - Considers total aggregate exposures in food, drinking water, and through home uses
- Toxicological reference points (RfD or CSF)
  - Subpopulation assessed
  - Exposure durations (1-day, short-term, and long-term)
- Provide reference doses (RfDs) and cancer slope factors (CSFs)
  - (greatly expand peer-reviewed toxicological values available outside of IRIS)

Human Health Protection

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DWLOC: How is it used in regulation?

- Theoretical upper limit on the concentration of a pesticide in drinking water
- Used internally by the OPP
- Point of comparison against model estimates of pesticides in water and monitoring data
  - Options for screening level and distributional analysis
- New Pesticide Registrations and Reviews
  - Focus on Population Adjusted Doses (PADs) and actual exposure data
- Basis for use and labeling requirements and risk reduction options

Human Health Protection

Safe Drinking Water Act & Community Drinking Water Systems

- OW finished drinking water standards
  - Maximum Contaminant Levels (MCLs) and
  - Secondary Drinking Water Standards (SDWS)
- MCL—maximum allowable or acceptable daily concentration of a pesticide (or other pollutant) in drinking water that may be consumed over a lifetime
- Legally enforceable standards
  - EPA's Office of Water (OW) in conjunction with OPP
- Based on chronic RfD and consider treatment technology

Human Health Protection

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CLEAN WATER ACT
(Federal Water Pollution Control Act 1972)

- Protect waters for designated beneficial uses: drinking, fish consumption, aquatic life, wildlife, and recreation
- Use Classification of waters
- Anti-degradation policy and procedure: maintain and protect existing uses
- Basis for narrative and numeric water quality criteria (EPA) and standards (States and Tribes)
  - For many States supplemented existing narrative standards already in rules (e. g. MN first WQ Rule 1967).

CLEAN WATER ACT
(Federal Water Pollution Control Act 1972)

- Objective: “restore and maintain the chemical, physical and biological integrity of the Nation’s waters”
- Interim goal: “water quality which provides for the protection and propagation of fish, shellfish and wildlife and provides for recreation in and on the water”, wherever attainable

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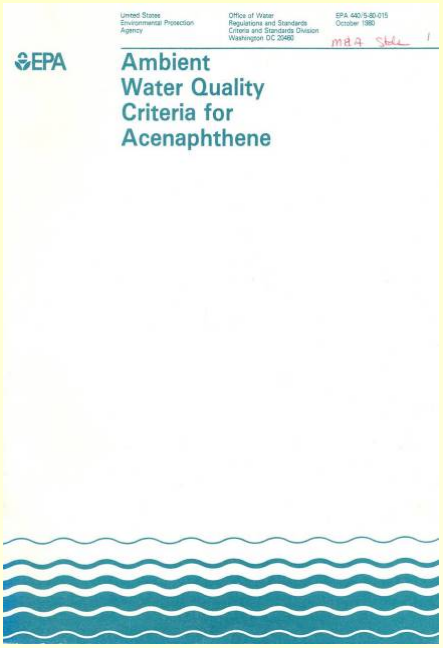
CWA-Section 304(a)(1)- requires EPA to publish water quality criteria for use by States and Tribes.

Provide data on:

- aquatic toxicity,
- bioaccumulation,
- human health.

Develop acute and chronic criteria for protection of aquatic organisms and humans



www.pca.state.mn.us/water/standards/index.html

Minnesota
Water Quality Standards

Human Health-based stds. protect people that:
- **Eat sport- caught fish**
- **Use surface waters for drinking**

***Toxicity* – protect aquatic community from toxic effects**

***Wildlife* – protect wildlife that eat aquatic organisms (L. Superior basin only)**

Most Stringent Standards Promulgated into:
- **Minnesota Rule ch. 7050 covers entire state**
- **Minnesota Rule ch. 7052 covers Lake Superior Basin-based on the Great Lakes Initiative**

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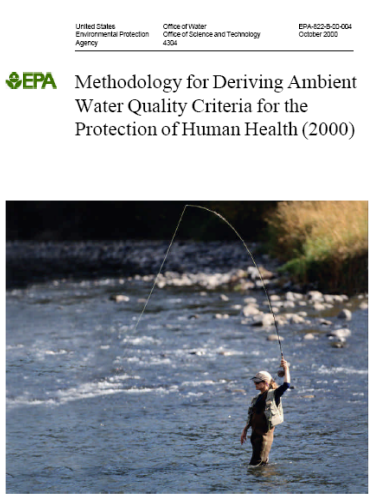
Ambient Water Quality Criteria and Water Quality Standards

- EPA criteria program: basis for water quality standards development and promulgation by designated States and Tribes
- Water quality standards are used to:
  - Assess impacts to surface waters for CWA 305(b) and impaired waters listings under 303(d) and best management responses by State Agencies;
  - Provide the Basis for Total Maximum Daily Load (TMDL) studies and effluent limits in NPDES/SDS permits; and
  - Communicate risk to surface water users.

Human Health-based 304(a)(1) Criteria

- Protective of lifetime (chronic) exposures to surface water pollutants
  - Drinking water
  - Fish Consumption
- Recreational use bacteriological criteria
- Not Enforceable; basis for water quality standards



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Program Differences in Human Health-based Values

- Exposure Routes– Ambient Surface Water
  - OPP: Drinking Water Use Only
  - EPA MCLs (Don't apply)
  - EPA Ambient Water Quality Criteria: Drinking Water and Fish Consumption
- The CWA authorizes and encourages states to modify EPA criterion based on statewide data
  - Minnesota Water Quality Standards(1990) - fish consumption for angling populations in Ontario and Wisconsin- uses 30 grams/day

Human Health Protection

Program Differences in Human Health-based Values

- Accounting for Other Exposure Sources–
  - OPP: Specific estimates from food and resident
  - EPA Ambient Water Quality Criteria:
    - EPA National Default (1980-2000): Relative Source Contribution Factor (RSC) of 20%
    - EPA National Default (2000): Exposure Decision Tree
  - Minnesota (1990) – RSC of 20%, except metals with RSC of 40% and mercury with 80%
- Sources of Toxicological Reference Values
  - OPP: Internal
  - OW: Integrated Risk Information System (IRIS)

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EPA OPP and Ambient Water Quality Criteria: Human health-based

EPA OPP
(RED, TRED, or IRED)

Acetochlor	2006
Alachlor	1998
Metolachlor	2002
+ cumulative risk	2006
Atrazine + degradates	2003
+ 2 other Triazines	2006
+ cumulative risk	2006
Chloropyrifos	2006
Diazinon	
+ 29 other OPs	
+ cumulative risk	

EPA OW
Currently Under Development

Alachlor
Atrazine (Draft Aq. Tox.)
Chloroform

http://www.epa.gov/waterscience/criteria/wqcriteria.html

http://www.epa.gov/pesticides/reregistration/status_page_m.htm

Human Health Protection

Minnesota Water Quality Standards: Human health-based

Acetochlor*	Proposed Std
Alachlor	Std.
Atrazine	Std.
Chloropyrifos	Std.
Metolachlor*	Proposed Std

*Reference doses from OPP tolerance reassessments and reviewed by the Minnesota Department of Health

www.pca.state.mn.us/water/standards/index.html

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OPP Registration and Reregistration Eligibility Decisions

- A.I. impacts to birds, honey bees, terrestrial mammals and plants, and aquatic animals and plants (major degradates)
- Risk quotients for most sensitive species: estimated exposure values/toxicity values (acute: LC50s; chronic: NOECs)
- Levels of Concern (LOCs) compared to RQs; set at different thresholds based on:
  - Type of test (acute:0.5; chronic: 1.0),
  - Pesticide classification (restricted use acute: 0.1-0.2), and
  - Organism (endangered species =0.05-0.1; plants =1.0)
- Labeled uses cannot result in "unreasonable adverse effects to the environment" (economic social environmental costs/benefits)

http://www.epa.gov/oppefed1/ecorisk_ders/index.htm Aquatic Life Protection

OPP Benchmarks – Released March 2007

OPP compiled chart of registration benchmarks (toxicity values x LOC)

- Acute and chronic fish
- Acute and chronic invertebrates
- Acute aquatic plants

- Chronic aquatic community (for atrazine only; IRED 2006)
- Table includes 71 pesticide active ingredients and a few degradates.

http://www.epa.gov/oppefed1/ecorisk_ders/aquatic_life_benchmark.htm

Aquatic Life Protection

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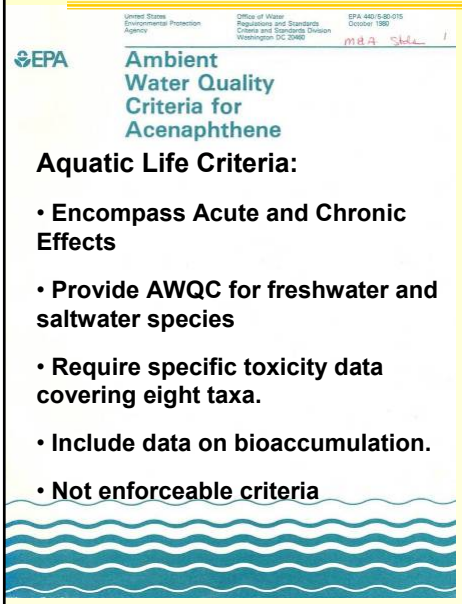
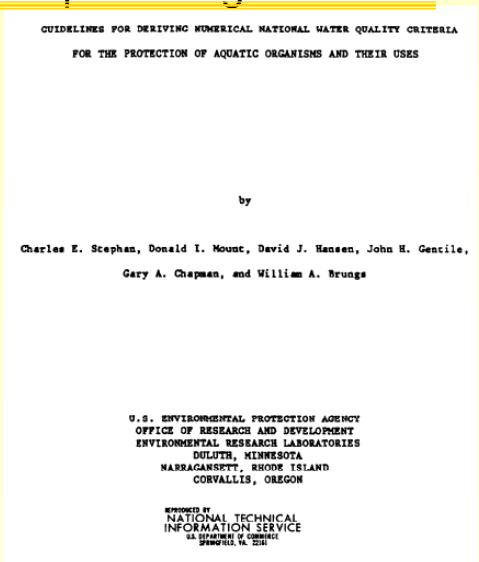
OPP Benchmarks

- RQs: Basis for use and labeling requirements and risk reduction options
- Benchmarks Table for use outside of registration (AAPCO/SFIREG Request):
  - Target monitoring and increase efficiency of regulatory processes that protect aquatic environments
  - Identify and prioritize sites and pesticides that may require further investigation
  - Indicate potential hazard to aquatic life, but may not be detailed toxicity and risk assessments

Aquatic Life Protection

Office of Water Ambient Water Quality Criteria for Protection of Aquatic Organisms




GUIDELINES FOR DERIVING NUMERICAL NATIONAL WATER QUALITY CRITERIA FOR THE PROTECTION OF AQUATIC ORGANISMS AND THEIR USES

by

Charles E. Stephan, Donald I. Mount, David J. Hansen, John H. Gentile, Gary A. Chapman, and William A. Brungs

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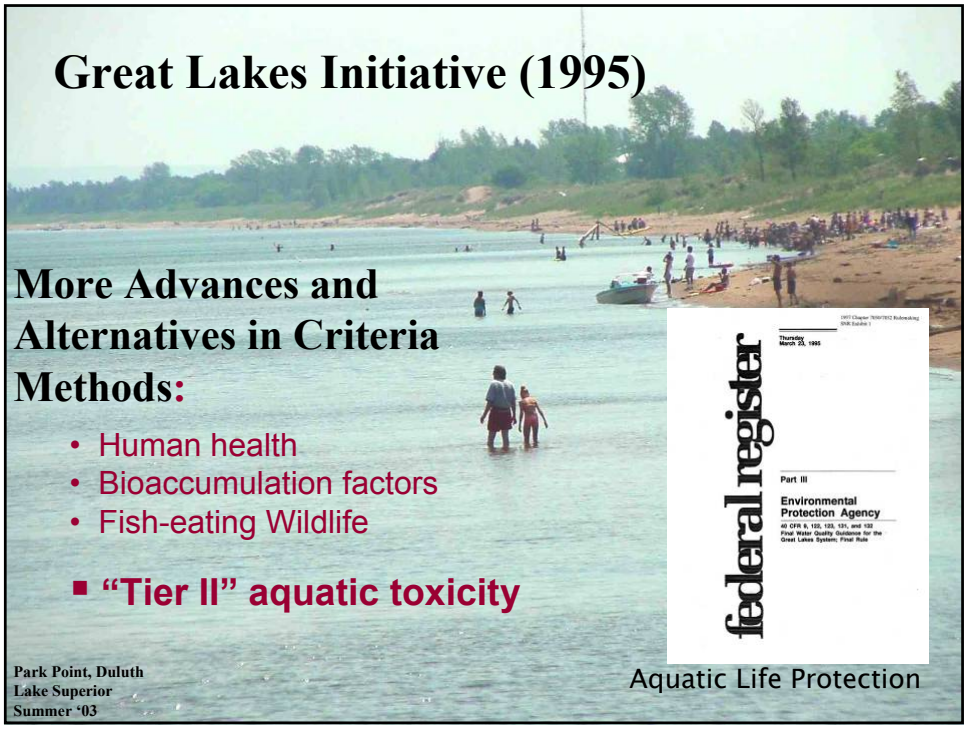
Great Lakes Initiative (1995)



More Advances and Alternatives in Criteria Methods:

- Human health
- Bioaccumulation factors
- Fish-eating Wildlife

- **"Tier II" aquatic toxicity**

Park Point, Duluth
Lake Superior
Summer '03

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Minnesota Water Quality Standards

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Ambient Water Quality Criteria and Water Quality Standards

- Data used from EPA toxicity studies, open literature, and studies submitted to EPA for other programs (e. g. registrant studies)
- Registrant studies from OPP not available publicly
  - States and Tribes request OPP DERs and studies directly from the registrants (Disclaimer to registrants-only want publicly available data)
- Minimum data set for National criteria—acute toxicity data covering eight defined aquatic animal taxa (Tier I)-methods for aquatic community acute and chronic criteria
- Great Lakes Initiative (GLI)—alternative approach for priority pollutants with less data; minimum data set: acute study with a member of *Daphnid* family ("Tier II")-Use of safety factors
- GLI method used statewide for some Great Lakes states (e.g. Minnesota)

Aquatic Life Protection

Ambient Water Quality Criteria and Water Quality Standards

- Aquatic plant data-critical for herbicides
  - Limited guidance in EPA methods (Final Plant Value)
  - Atrazine draft criteria—OPP's aquatic plant evaluation using a community energetics model and monitoring data
    - Under review by an OPP Science Advisory Panel in December 2007.
    - Final results pending
  - Minnesota used species-sensitivity distribution for acetochlor and metolachlor proposed standards

Aquatic Life Protection

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EPA Ambient Water Quality Criteria and Minnesota Standards for Modern Pesticides: Aquatic Toxicity

EPA
Atrazine (Draft)
Chloropyrifos
Diazinon
Endosulfan (α & β)
Malathion
Parathion

MN
Acetochlor (Proposed)
Alachlor
Atrazine
Chloropyrifos
Endosulfan
Metolachlor (Proposed)
Screening values
2, 4-D
MCPA
MCPP
Methyl parathion
Metribuzin

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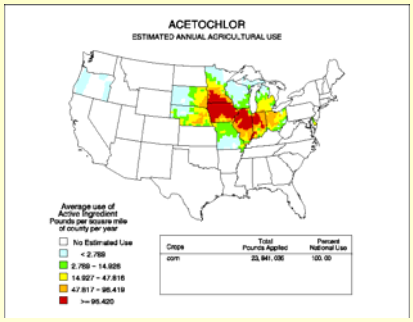

MN-New Standard for Two Corn Herbicides

1. Acetochlor
   Surpass, Harness
2. Metolachlor
   Bicep, Dual

In response to:

- MN Dept. of Agriculture
- Detections in surface waters
- Sensitivity of Aquatic plants basis for Chronic Standard

Proposed Class 2 Standards, µg/L (parts per billion)

Herbicide	Chronic	Maximum	Final Acute Value
Acetochlor	3.6	86	173
Metolachlor	23	271	543

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Possible Impact of Proposed Standards
3.6 µg/L Acetochlor
23 µg/L Metolachlor
(4-day average)

- **Proposed stds. used in assessments for draft impaired waters list for 2008 [303(d)]**
- **Monitoring data show exceedances of acetochlor std.; none for metolachlor**
- **Possibility of future TMDLs for acetochlor**

MDA Acetochlor Data, 1996-2006

Draft Impaired Rivers List Dec. 2007	Maximum 4-day Mean from assessment µg/L	No. of Means > Chronic Std.*
Little Beauford Ditch	5.43	2
Le Sueur R.	5.67	3

* 2 or more exceedances in 3 years needed for listing

MDA = MN Dept. of Agriculture

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Future Work to Enhance Pesticide Management Activities

- Expand and focus reviews on classes of pesticides and their degradates
  - Already started for human health effects
  - Assessing mixtures for compounds with same mode of toxic action affecting aquatic species
- Toxicity of pesticide product formulations
  - Current OPP projects
  - Memos on tolerance for use of inerts (e.g. alkylphenols)
- Utilize datasets across programs more efficiently- OW/OPP/SFIREG/State projects
- Build cooperation with State and Tribal standards and FIFRA programs on common pesticides of interest

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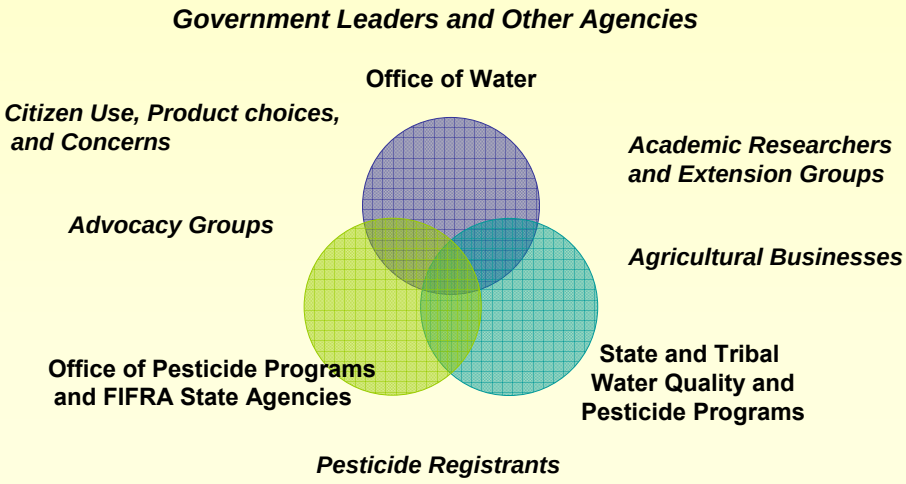
All of Us Have Roles in Pesticide Management



Acknowledgements

- MPCA: David Maschwitz, Phil Monson
- SWiMS: Sarah Lehmann and Holly Arrigoni
- OPP: Catherine Eiden and Sheila Piper

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